QUEBECOR STATEMENT OF BASIS

GENERAL COMMENTS

QUEBECOR: STATEMENT OF BASIS
General Comments

SECTION 1
INTRODUCTION

The purpose of this document is to provide comments on the Statement of Basis (SB) for Quebecor Printing Atglen Inc. (Quebecor), issued by the United States Environmental Protection Agency (EPA). The SB presents EPA's preferred remedy for corrective action at Quebecor. The selected remedy differs significantly in cost and approach when compared to remedies proposed by Quebecor in the Corrective Measures Study (CMS). Quebecor requests the opportunity to meet with the EPA to discuss remedial options and the comments contained herein, prior to EPA's final selection of corrective action measures for the Quebecor facility.

The following text first, outlines the EPA's selected remedy; second, presents the approach recommended by Quebecor; and third, provides site-specific information supporting Quebecor's opinion that the EPA's approach is excessive, and the approach presented herein is more reasonable. The following comments also provide a rationale and justification for the selection of alternative concentration limits (ACLs) for corrective action at the site, using a risk-based approach developed by the American Society for Testing and Materials (ASTM).

BACKGROUND

The Quebecor facility was extensively investigated during the RCRA Facility Investigation (RFI) to delineate the extent and magnitude of all impacted media on the site. A human health based quantitative risk assessment (RA) conducted during the RFI process also evaluated all potential exposure pathways for the site, relative to human health risks. The results of this RA, which was unconditionally accepted by the EPA, determined that no short- or long-term human health risks were present within or outside the facility boundaries.

After the completion and acceptance of the RFI, Quebecor developed a CMS which outlined potential remediation options for the facility, and considered the applicability, implementability, and effectiveness of each option. The final conclusions reached by the CMS developed a corrective measures strategy sufficient to remediate impacted soils and groundwater at the site. It is important to note that the decisions reached in the CMS considered that there were no human health risks on the site, as determined by the EPA-accepted RA, but nevertheless proposed a range of remedial response.

Despite this record, the EPA-generated SB requires stringent remediation of both groundwater and subsurface soils. The media clean-up standards (MCS) selected by the EPA as remediation targets for soils are Pennsylvania Department of Environmental Resources (PADER) groundwater protection standards, and for groundwater are maximum contamination levels (MCLs) as promulgated by the Safe Drinking Water Act. Note that both PADER groundwater protection standards and MCLs were developed based on

conservative assessments of human health risk for long-term exposure by drinking water ingestion.

In apparent contradiction, the SB later states (Section V, page 11) that no onsite groundwater wells exist to provide an onsite exposure pathway for groundwater, and further reports that there are no risks to offsite receptors from any media. Regardless of the EPA's own acceptance of this "no risk" characterization, the SB requires remediation of subsurface soils and groundwater to very stringent levels, based on potential exposure pathways which do not exist, nor having the potential to exist at this site.

Quebecor must continue to assert that drinking water risk-based cleanup goals are not applicable to this site since there are no exposure pathways for groundwater contact (either potable or otherwise) associated with this site. To assess the potential for plume migration, a detailed groundwater model, conducted as part of the RFI, demonstrated that no off-site migration of impacted groundwater will occur. Further, the groundwater model showed that essentially no migration of the plume will occur because the rate of degradation and sorption of contaminants to the soil is equivalent to the rate of groundwater migration. This groundwater model used very conservative assumptions for the determination of dissolved phase transport over a 23 year timeframe. These assumptions included no source removal, no degradation, and no groundwater withdrawal from a remedial system. This model was also unconditionally accepted by EPA as part of the RFI. The absence of groundwater receptors also means that there are no receptors for impacted subsurface soil leaching to groundwater. In summary, the Quebecor site has no pathway for exposure to impacted groundwater or soil, and no risk to human health exists on- or offsite. Therefore no remediation is necessary to be protective of human health.

At the facility downgradient property boundary and wells at the perimeter of the plume, Quebecor currently meets MCLs and will monitor for future compliance of MCL concentrations in groundwater. Considering this, remediation within the impacted areas (which are over 600 feet from downgradient property lines) to MCLs is unwarranted for the following reasons:

- There is an absence of risk within the plume
- There are no long-term exposure receptors to soil or groundwater.
- EPA-accepted groundwater modeling shows that impact will not move offsite.
- Remediation to MCLs is technically infeasible based on site conditions. The lithology at Quebecor consists of saprolitic silt-clay soils. The tight platey clays in the soils restricts the movement of dissolved phase contaminants, restricting the ability for contaminant withdrawal for treatment. Residual solvent can be retained in pore spaces as immobile fluids in both the saturated and unsaturated zones. In addition, the

hydrocarbon constituents of the solvent have an affinity to adsorb to the soil, bonding with organic carbons and clay particles. The fraction of organic carbons is more than two percent at some locations at Quebecor, promoting adsorption of chemicals of concern.

Considering the above facts, Quebecor proposed that any cleanup levels applied to this site should be alternative concentration limits (ACLs), tailored to site-specific parameters and hypothetical risk.

ACLs may be theoretically achievable; however, actual remedial performance is dependent on site-specific conditions. Extensive research has documented that groundwater restoration by many remedial systems, especially pump-and-treat systems, eventually reach an asymptotic condition where no appreciable reduction in contaminant concentrations can be achieved with continued remediation system operation. More specific research (Makdisi and Garvason, 1992) has shown that concentrations of volatile organics frequently will reach an asymptotic equilibrium; continued pumping often has no further or notable effect on these concentrations, even after years of additional treatment. Thus, while ACLs are presented as target clean-up goals, remediation should be considered complete if or when asymptotic conditions are reached.

RCRA SUBPART S

EPA's proposed RCRA subpart S regulations, 55 Fed. Reg. 30798 (27 July 1990), also permit the approach urged in this document. Groundwater that is not a current or potential source of drinking water does not have to meet media cleanup standards if it is not a current or potential source of drinking water. 55 Fed Reg. at 30829. In determining whether groundwater is a current or potential source of drinking water, not only is the total dissolved solids and other natural contamination level in the water considered, but the preamble states, "In other cases, groundwater may not fall into Class III [the class designated as undrinkable], but, because of its distance from any population or other factors, is unlikely to become a source of drinking water in the foreseeable future." Id. (emphasis added). EPA goes on to state that with respect to such waters, "natural attenuation might play a major role in the remedy." Id.

Not only is the future use of the groundwater pertinent in selecting cleanup standards, but it also bears upon the selection of points of compliance. Although the Agency's "general goal" is to remediate the entire plume of contamination, id. at 30830, alternative points of compliance can be set depending on, among other factors, "the technical practicabilities of groundwater remediation at that particular site" and "exposure and likelihood of exposure." Id.

The flexibility in the proposed subchapter S regulations is manifested in other areas. For example, proposed Section 264.520 (c) provides that even if an action level is exceeded in groundwater, EPA may allow the holder of a RCRA

permit to "apply for a determination of no further action" if EPA determines that the release does not pose a threat to human health and the environment. Even more significant for present purposes, proposed Section 264.525 (d) provides that cleanup of groundwater to the "media cleanup standard" is not required if the groundwater is "not a current or potential source of drinking water" (nothing in the proposed regulations prevents use of deed restrictions to exclude particular groundwater as a source of drinking water) or if remediation to the "media cleanup standard" is "technically impracticable."

Here, Quebecor does not ask for the full range of relief to which it may be entitled under proposed subchapter S. Instead, it urges steps that will be as fully protective of human health and the environmental as the EPA's preferred alternative, but which will achieve that result at a lower cost. Quebecor proposes to ensure that persons outside the facility are never exposed to contaminated water by monitoring and treating the water. Monitoring at designated perimeter wells will confirm the continued adherence to drinking water standards downgradient of the plume. With respect to the water on the Facility, Quebecor proposed to monitor and treat the water, so that the plume does not expand. Within the plume, Quebecor proposes to treat the water to an alternative risk-based cleanup standard. Until ACL conditions discussed in this document can be achieved throughout the Facility, Quebecor proposes a deed restriction that will prevent any use of the contaminated groundwater beneath the Facility as a drinking water source.

SECTION 2
DEVELOPMENT OF ALTERNATIVE CONCENTRATION LIMITS

Introduction to ACL Development

The Quebecor approach is to develop the specific ACLs for remedial clean-up goals. These ACLs will be protective of human health and more technically feasible to achieve due to their consideration of site specific factors. The process of ACL development for Quebecor is detailed in the following sections.

The strategy for corrective action which is receiving the most active support from both the Federal and State regulatory agencies (EPA Headquarters, EPA Region III, and the PADER) is to apply concentration levels based on risk to human health and the environment, as defined by site specific conditions. This recognized strategy provides a framework to address sites on a timely basis, with clean-up levels that are cost-effective as well as protective.

A risk-based approach to corrective action known as RBCA was described in ES 38-94, *Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM, 1994). As defined by two members of the ASTM RBCA development group, Curt Stanley and Paul Johnson (1994), RBCA "has been developed to provide a technically-defensible, consistent, multi-tiered, exposure/risk-based assessment methodology, which provides a strong basis for site-specifically determined classification and initial response, clean-up goals, and corrective action for soil and groundwater." RBCA was developed by a diverse panel of experts with representatives from state and federal regulators, industry, financial community (banking and insurance), and environmental consultants.[1]

The RBCA tiered approach is suitable for application to the Quebecor site, based on the following:

- *RBCA provides a reasonable approach to corrective action based on risk to human health.*
  This objective is aligned with the RCRA process, which provides corrective action that is protective of human health and the environment.

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[1] The National Environmental Policy Institute, in a recent interim report entitled "Science-Based Risk Assessment: A Piece of the Superfund Puzzle," has endorsed the ASTM's risk-based correction action (RBCA) and finds it to be compatible with numerous Superfund sites and other hazardous waste site cleanups. 26 Envt. Rptr, 247 (May 26, 1995).

- *RBCA is a tiered approach to the determination of risk levels at a site.* This process is similar to the RCRA process of investigating contaminant releases at a site, which includes the RCRA Facility Investigation (RFI) and a risk assessment (RA) to quantify risk. The RA conducted from Quebecor is a full quantitative risk analysis with support from a fate and transport groundwater flow model.

- *RBCA has been developed for use at sites with petroleum releases.* The toluene-xylene based solvent that is the contaminant of concern at Quebecor is a petroleum distillate. The solvent-indicator compounds which are the chemicals of concern at Quebecor are the same as addressed by RBCA (i.e., benzene, toluene, ethylbenzene, and xylenes [BTEX]). RBCA provides a definition of "petroleum" which includes "petroleum solvents" (Section 3.1.22).

- *RBCA was developed for releases at underground storage tank (UST) sites.* The solvent releases at Quebecor were part of an UST system, as well as a surface spill.

- Corrective action has been requested at Quebecor despite an accepted Risk Assessment that demonstrates no risk to onsite or offsite receptors. (The Risk Assessment was included in the RFI Report, which was unconditionally approved by the EPA in correspondence dated 25 March 1994 between Vernon Butler and Thomas Preble.) There are no groundwater wells onsite to provide an exposure pathway. In light of this, it is more reasonable to consider site-specific target levels (SSTL) for clean-up rather than Safe Drinking Water Act MCLs, which were conservatively set for long-term exposure from drinking water supply wells.

- Corrective action to site-specific risk-based concentrations also has the practical advantage of being more technically feasible than MCLs. The technical impracticality of remediation to MCLs at some sites has been well documented both by research publications and by EPA guidance documents (OSWER Directive 9234.2-25, 4 October 1993; and 55 FR 30798, Section VI(F)(6)(c))--proposal Subpart S regulations). This conclusion was supported by the EPA guidance on groundwater remediation for UST sites (OSWER Directive 510-F-93-030, October 1993) which states that pump-and-treat remedial systems of petroleum types and constituents such as BTEX might not meet MCLs. Site conditions at Quebecor make it technically impractical to reach MCLs. These conditions, as discussed previously, include the highly absorptive capacity of the contaminants to the saprolitic silt-clay soil and the low hydraulic conductivity of the formation which limits the rate of groundwater turnover for dissolved phase remediation.

Comparison of RCRA Process to RBCA Approach.

This section outlines the RBCA tiered approach, and highlights similarities with the process specified by RCRA to evaluate corrective action needs at a site.

Site Assessment

Before applying the RBCA tiered approach, the chemicals of concern, obvious environmental impacts, and any impacts to humans and environmental receptors must be identified. Historical records for the site and surrounding area are also reviewed to better define all potential sources of impact to the site and surrounding community. This is similar to the RCRA Facility Assessment (RFA) initially applied to a candidate site.

Site classification also considers land use. The Quebecor site has been an industrial facility for 25 years, and this usage is reasonably expected to continue. Quebecor is willing to implement institutional controls (deed restriction) that would require the developed portion of the facility to retain its industrial-use status. The deed restriction would contain a contingency requiring a re-assessment of risk prior to any change of land use in the future.

RBCA Site Classification

Based on the data collected during the site assessment, the site is classified according to the urgency of need for an initial response action. Response actions are expected to be completed simultaneously with the RBCA process. In the case of Quebecor, response actions were implemented during the initial discovery of environmental impact. Conventional methods (i.e., site delineation, groundwater and NAPL recovery (beginning in 1986), and groundwater monitoring) were performed as interim corrective actions.

Demonstration of Risk

For a site to continue through the RBCA process, a defined risk must exist. The risk assessment completed as part of the RFI calculated site risk values for all site exposure pathways, and demonstrated that there was no risk to onsite or offsite receptors. No exposure pathway exists for groundwater beneath the facility due to the absence of any onsite potable water-supply wells, on- or offsite discharges of contamination to surface water, or offsite migration of groundwater. The latter conclusion was reached by a groundwater flow model which indicated no offsite migration in a 23-year time frame using very conservative assumptions, including no biological contaminant degradation, no hydraulic containment, and no source removal.

Regardless of this "no-risk" finding, the SB is requiring remediation. Therefore, to further consider the RBCA tiered approach, it is necessary to assume a hypothetical risk based on installation of a potable water well at the downgradient boundary of the contaminant plume in each area of concern.

This risk is hypothetical because no such well exists, and the institutional controls requested by the EPA prohibit the installation of a drinking water well onsite in the areas of concern.

Tier 1 Evaluation

Tier 1 of the RBCA approach is a qualitative risk assessment based on general site information. Tier 1 specifies the identification of obvious environmental impact; potentially affected sensitive receptors (schools, homes, water bodies, etc.); and significant exposure pathways (drinking water wells, recreational use of streams, vapor transport, etc.). This information typically is sufficient to categorize a site and determine an acceptable timeframe for corrective action. Tier 1 uses risk-based screening level (RBSL) look-up tables to characterize site risk relative to generic, conservative risk-based concentrations. Though generic, the RBSL look-up tables are based on industry-recognized and accepted equations, and are technically defensible.

The equivalent of a Tier 1 evaluation for Quebecor was completed by the EPA (*Environmental Priorities Initiative Preliminary Assessment*, by NUS Corporation, 23 October 1989) RCRA facility assessment (RFA), which delineated the areas of concern, the contaminants of concern, and potential receptors and exposure pathways. The EPA effectively categorized the site as presenting a potential risk by issuing the Administrative Order by Consent (Consent Order). The Consent Order stipulated continuation of the existing groundwater remediation system as an interim corrective measure. The RBCA process also provides for interim corrective measures.

Tier 2 Evaluation

Tier 2 calls for site-specific data to determine appropriate risk-based actions. These data include:

- definition of the area of maximum impact
- sampling data
- definition of the potential for plume migration
- reasonable maximum exposure (RME) scenarios

From these data, Tier 2 sets corresponding corrective action levels that are site-specific and protective of human health and the environment.

For the Quebecor site, the equivalent of a Tier 2 was accomplished by the RFI, which delineated the nature and extent of contaminants and concentration levels, evaluated plume migration potential, and included a risk assessment for full characterization of risk potential to receptors by all potential exposure pathways.

Tier 3 Evaluation

Tier 3 involves a more intensive analysis of site data using sophisticated means such as modeling. In some cases, this may necessitate additional data collection, site characterization, or data manipulation. The Quebecor RFI included sophisticated mathematical analysis as indicated by the groundwater model, as well as a full quantitative RA. Modeling was performed by the application of site-specific parameters to the U.S. Geological Survey Method of Characteristics model (MOC). Another data evaluation tool conducted at Quebecor during the CMS was feasibility testing, including aquifer testing and bioremediation testing.

Appendix A provides a summary of the groundwater model completed for Quebecor during the RFI. The MOC model was used to simulate dissolved-phase transport. The objective of the simulation was to conservatively estimate the movement of toluene, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate over a 23-year period. The comparison of the computer simulations to the actual analytical data suggests that degradation and sorption processes virtually stop the movements of toluene and ethylbenzene so that the rate of degradation and sorption are nearly equivalent to the rate of groundwater migration. This results in an essentially steady state condition with no effective plume movement over time. Under the conservative assumptions considered in the model, the predicted toluene, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate plumes do not approach property boundaries 23 years after the release.

The effectiveness of biological degradation for the existing suite of micro-organisms was investigated in the CMS. Bench testing at Quebecor indicated that the site had an acceptable population of micro-organism to be conducive for natural biodegradation of the toluene-xylene based solvent residuals onsite. The summary provided in Appendix B (*Assessment of Natural Bioremediation Potential at the Quebecor Printing Atglen Inc. Site)* indicates that natural bioremediation can be considered an effective technique for mitigation of the toluene contamination at the site. This is a significant consideration in the development of site-specific clean-up levels. A zone of attenuation will exist in areas outside of the area of influence of a remediation system and the outside edge of the plume. In this zone, natural bioremediation will degrade contaminants.

During Tier 3 evaluation, points of compliance for application of site-specific clean-up standards are selected. The Quebecor Statement of Basis (SB) presented several wells as points of compliance. Based on existing conditions, these wells can be characterized as either (1) within the contaminant plumes or (2) along the downgradient perimeter of the plumes. In the RBCA process, the first group of wells, i.e., those within the contaminant plume, will be identified as points of compliance for site-specific clean-up standards (hereafter called ACL monitoring points). These include wells MW3, MW4, RW-1, MW10, S-3, and RW-2. The second group of wells, located along the downgradient perimeter of the plumes, will be use as points of compliance to

MCLs, as specified in the SB. These wells include MW8, MW9, MW12, MW13, and the Engel domestic well. This is a very conservative location for points of compliance relative to the recently passed Pennsylvania legislation *Land Recycling and Environmental Remediation Standards Act (Senate Bill 1)*. This bill defines "Point of Compliance" as follows: "For the purpose of determining compliance with groundwater standards, the property boundary at the time the area of contamination is defined or such point beyond the property boundary as the Department of Environmental Resources may determine to be appropriate."

Quebecor recently collected groundwater samples from the perimeter monitoring wells for analysis of BTEX (Table 1). This was conducted as a second year confirmation of the groundwater modeling results which stated that no significant contaminant migration will occur. Concentrations of BTEX in perimeter wells all remained below detection limits.

Calculation of Site-specific Risk-Based Screening Levels (RBSLs)

RBSL exposures for the Quebecor site have been calculated, based on site-specific parameters, for comparison with the clean-up standards presented in the SB. Section VIII of the SB specifies two media of concern: subsurface soil and groundwater. For these two media, there are six potential exposure pathways:

- groundwater ingestion (potable groundwater supply only)
- groundwater enclosed space (indoor) vapor inhalation
- groundwater ambient (outdoor) vapor inhalation
- subsurface soil ambient (outdoor) vapor inhalation
- subsurface soil enclosed space (indoor) vapor inhalation
- subsurface soil leaching to groundwater

Ambient vapor monitoring data collected during the RFI demonstrated no risk from enclosed space (indoor) vapor inhalation or ambient (outdoor) vapor inhalation (i.e., measured concentrations were all below background concentrations). Therefore, the two remaining exposure pathways of concern are:

- groundwater ingestion (potable groundwater supply only)
- subsurface soil leaching to groundwater

Site-specific concentrations and physical conditions for the Quebecor site were compared to the assumptions used to derive the RBCA Tier 1 Look-up Table X2.7, presented as an example in Appendix X2 of RBCA. The Quebecor site-specific parameters were either similar to or more conservative than the example table; therefore, Table X2.7 was presumed to be valid for Quebecor. These RBSL values are listed below.

SUBSURFACE SOIL LEACHING TO GROUNDWATER
(all values milligram per kilogram [mg/kg])

Compound	EPA Media Clean-up Standard	RBSL-Industrial
Toluene	0.5	361
Ethylbenzene	1.0	1,610
Xylenes	0.7	RES

RES = Selected risk level is not exceeded for pure compound present at any concentration.

GROUNDWATER
(all values milligrams per liter [mg/l])

Compound	EPA MCLs	RBSL-Industrial
Benzene	0.005	• 0.987 (1E-04 risk factor) 0.00987 (1E-06 risk factor)
Toluene	1.0	20.4

• Note
The RBSL value for benzene warrants a discussion of cancer risk factors. During the determination of remedial remedy, CERCLA recognizes acceptable risk ranges of cumulative risk from 1E-04 to 1E-06 for remedial goal. PADER Soil Cleanup standards accept 1E-04 cancer risk levels when "supplemented by engineering and institutional controls which increase the overall level of protectiveness to 1E-06". Also, the EPA guidance document 55 FR 30798, proposed Subpart S, and recently signed Pennsylvania legislation (*Land Recycling and Environmental Remediation Standards Act (Senate Bill 1)*, has provisions for the application of site-specific clean-up standards and accept cancer risk levels ranging from 1E-04 to 1E-06 for non-continuous exposure for nonresidential exposure scenarios. More specifically, the 1E-04 risk level can be considered for sites with institutional controls to prevent exposure to contaminated media. Section V of the SB states that there are no on-site human receptors for groundwater and the deed restriction will prevent future exposure of human receptors to groundwater. In these conditions, EPA and PADER guidance documents allow for the establishment of the 1E-04 risk level. Considering that there is no current or future risk, media clean-up standards for the site should be based on site-specific risk based factors; therefore, a 1E-04 risk factor should be applied at Quebecor for the media clean-up standard.

In accordance with the RBCA process, the site-specific RBSL values for industrial land use are concentration limits which are protective of human

health. Utilizing this methodology, as well as the aforementioned exposure controls, media clean-up standards for remediation at Quebecor should be set to the RBSL-values as follows:

SUBSURFACE SOIL

Toluene	361	mg/kg
Ethylbenzene	1,610	mg/kg
Xylene	N/A	

GROUNDWATER

Benzene	0.987	mg/l
Toluene	20.4	mg/l

Application of Risk-Based Corrective Action at Quebecor

UST Area

Remedial action

No risk has been identified at the UST area. Removal of the USTs will be conducted in accordance with PADER requirements. Subsequent to the completion of this task, the groundwater conditions will be assessed to determine if additional corrective action is warranted.

Monitoring

In the tank field area the wells in the interior of the plume will likely be destroyed by soil removal, including MW3, MW4, and RW-1. Therefore, alternative monitoring wells within the impacted area will be selected for ACL monitoring points subsequent to UST removal activities. These ACL monitoring points will be used to monitor remediation effectiveness towards the attainment of media clean-up standards.

Points of compliance are established for the tank field as MW-8 and MW-9. These points are 50 feet from the original source of impact. They will be protective of human health and the environment as the groundwater model predicts that plume movement will not reach these points. The points are also over 580 feet from the downgradient property boundary which would provide a long-term notice for remediation should concentrations in the points of compliance exceed the MCLs.

Perimeter points of compliance are to remain at MCLs throughout remediation.

Railroad Siding Area

Remedial Action

Institute combined soil vapor and groundwater extraction as detailed in the CMS and SB. Continue remediation until ACLs are attained at monitoring points within the plume.

Monitoring

Monitoring wells within the impacted portion of the railroad siding area, S-3, S-1, and RW-2 will be used to monitor remediation effectiveness towards the attainment of media clean-up standards.

The points of compliance for the railroad siding area are selected as MW-12 and MW-13. These wells are 150 feet from the impacted soils. They will be protective of human health and the environmental as the groundwater model predicts that plume movement will not reach these points. The points of compliance are also over 640 feet from the downgradient property boundary which would provide a long-term notice for remediation should concentrations in the points of compliance exceed the MCLs.

Perimeter points of compliance are to remain at MCLs throughout remediation.

Groundwater Monitoring Plan

Conduct annual groundwater sampling to evaluate groundwater quality and to ensure no plume movement to the points of compliance. ACL monitoring wells will be monitored on the same schedule to determine the effectiveness of the remediation efforts.

Groundwater will be monitored for benzene and toluene for compliance with media clean-up standards.

Completion of Remediation Phase

Remediation completion will be demonstrated after monitoring of the points of compliance and the points of remediation indicate no exceedance of stipulated contaminant clean-up levels for three consecutive years.

The remediation system will be designed to reach the alternate concentration limits, if technically feasible. However, as stated previously, research has documented that groundwater restoration by many remedial systems, especially pump-and-treat systems, eventually reach an asymptotic condition where no appreciable reduction in contaminant concentrations can be achieved with continued remedial system operation. To avoid this problem, Quebecor will employ cutoff criteria which will be used to determine the termination of remediation. These criteria will be as follows:

- An asymptote will be considered achieved, denoting the completion of remediation, if the standard deviation from one year of groundwater monitoring data does not vary by more than 20% and does not exceed 5 parts per million per sample during the quarter; or,

- remediation will be considered achieved if not more that 0.50 pounds of VOCs are recovered per 10,000 gallons of groundwater pumped; or,

- remediation will be considered completed if the average VOC concentrations in influent water for six consecutive months show a 90% or greater reduction in concentration over the average of the first six months of operation; or,

- remediation will be considered completed even if none of the foregoing are satisfied, if Quebecor and the USEPA subsequently agree to another criteria.

Summary

This document demonstrates that the ASTM RBCA process, which allows development and application of risk-based clean-up standards, is the most appropriate for specifying alternative concentration limits (ACLs) for continuing corrective action at this site. The Quebecor site satisfies all of the required steps specified in the RBCA process, which is becoming widely recognized by regulatory agencies as a means to providing a reasonable approach to corrective action based on risk to human health.

The corrective action goals for Quebecor as presented by RBCA will have ACLs that will be protective of human health, perimeter points of compliance which will meet MCLs, and remedial systems which will prevent further deterioration of the environment through source control and containment.

TABLE 1
GROUNDWATER SAMPLE ANALYTICAL DATA SUMMARY
QUEBECOR PRINGING ATGLEN INC.
ATGLEN, PENNSYLVANIA

AUGUST 1992 THROUGH MAY 1995

WELL	DATE SAMPLED	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TOTAL BTEX
MW-8	31-Aug-92	< 1	< 1	< 1	< 3	< 6
	1-Mar-93	< 5	< 1	< 1	< 3	< 10
	22-May-95	< 1	< 1	< 1	< 1	< 4
MW-9	31-Aug-92	< 1	< 1	< 1	< 3	< 6
	1-Mar-93	< 1	< 1	< 1	< 3	< 6
	22-May-95	< 1	< 1	< 1	< 1	< 4
MW-12	31-Aug-92	NA	NA	NA	NA	NA
	1-Mar-93	< 1	2	< 1	< 3	2
	22-May-95	< 1	< 1	< 1	< 1	< 4
MW-13	31-Aug-92	NA	NA	NA	NA	NA
	1-Mar-93	< 1	2	< 1	< 3	2
	22-May-95	< 1	< 1	< 1	< 1	< 4

NA = not analyzed
< - Indicates below analytical method detection limit
BTEX concentrations reported in micrograms per liter (µg/L)

QUEBECOR STATEMENT OF BASIS
SUPPORTING DOCUMENTS REFERENCE LIST

American Petroleum Institute Risk/Exposure Assessment Decision Support System (DSS), Version 1.0, prepared by DuPont Environmental Remediation Services and Woodward-Clyde Consultants, May 1994.

CERCLA Regulations and Keyword Index, 1991 Edition, Compiled and published by McCoy and Associates, Inc., 401 p.

"Cleanup Standards for Contaminated Soils-Interim", Pennsylvania Department of Environmental Resources, December 1993

"Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities", Federal Register 55 FR 30798, 27 July 1990, Proposed Rule.

"Demonstrating the Technical Impracticality of Groundwater Restoration: EPA Provides the Approach", by Julie A. Widman, Journal of Environmental Regulation, Summer 1994, pp. 403-409.

Environmental Resources and Energy Committee, Senate Bill 1--Bill Analysis, 3 January 1995.

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"EPA Region III Risk-Based Concentration Table, Background Information", by Roy L. Smith, 9 February 1995.

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"Reaching Contaminant Concentration Asymptote Higher Than Cleanup Goals: Criteria Considerations For Discontinuing Pump and Treat at Three CERCLA Sites"; Makdisi, R.S. and Garvason, R.; 1992.

"Risk-Based Corrective Action, The Top Ten Misconception", by Curtis C. Stanley and Paul C. Johnson, LUSTLINE, December 1994.

"Risk-Based Cleanups Form Powerful Approach to Prioritizing, Restoring Hazardous Waste Sites", by M.C. Maritato, R.E. Keenan, M.A. Barbara, and P.J. Cotch, Environmental Solutions, January 1995, pp. 51-56.

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QUEBECOR STATEMENT OF BASIS

SPECIFIC COMMENTS

SPECIFIC COMMENTS

NOTE: The following specific comment items have been arranged in order of importance.

1. Page 11, third paragraph, first sentence.

"The potential cancer risk from the site-specific contaminants is 2.54E-04"

As part of the RFI, GES developed a risk assessment for this site which calculated the highest cancer risk relative to site-specific contaminants to be 1.6E-8. The RFI report, which includes the risk assessment, was unconditionally approved by the EPA in correspondence dated 25 March 1994 between Vernon Butler and Thomas Preble. This cancer risk was apparently changed in the SB by the EPA. Quebecor objects to this unilateral EPA action which is not supported by the record and which directly contradicts the earlier assessment accepted by the EPA.

2. Page 11, second paragraph, entire paragraph.

Referring to the risks from groundwater exposure, the SB states:

"The potential cancer risk from the site-specific contaminants is 2.54E-04. A 2.54E-04 risk represents the probability that 2.5 persons out of 10,000 people of average weight who are exposed to the site contaminants will develop cancer. This is greater than EPA's acceptable risk level of 1E-06. The 1E-06 risk represents the probability that an additional 1.0 person will develop cancer out of every 1,000,000 people who are exposed to the site contaminants by drinking two liters of water daily during a 70 year life span."

The RFI risk assessment, which was accepted by EPA, has clearly noted that groundwater is not a pathway for exposure for the following reasons:

- There are no onsite potable wells.
- Impact has never been detected in offsite wells.
- A conservative groundwater model for this site has shown that offsite migration of chemicals of concern is unlikely. Specifically, this model indicates that over a 23-year period, during which time there is assumed no source removal and no attempt the achieve hydraulic control of the plume, no offsite migration of the plume will occur.
- Physical institutional controls, i.e., fencing and security guards, already in place at the facility, further preclude the likelihood of inadvertent contact with groundwater.

- Quebecor is willing to initiate deed restrictions for the impacted portion of the site which will disallow the installation of a potable well.

- Groundwater monitoring will demonstrate no migration of contaminants beyond their localized areas as determined by the computer model.

- The EPA has stated in the SB that "the contaminated groundwater plume is contained and not migrating to ecologically sensitive areas..." (page 11, third paragraph).

- The EPA has stated in the SB that "...there are no on-site human receptors because the groundwater beneath the Facility is not used for any purpose." (page 12, first paragraph).

Quebecor objects to risks being calculated on the basis of exposures that do not exist and are not reasonably likely. Quebecor also objects to this unilateral action which is not supported by the record and contradicts the risk assessment accepted by EPA.

Also, the EPA guidance document 57 FR 30798, proposed Subpart S, and recently signed Pennsylvania legislation (*Land Recycling and Environmental Remediation Standards Act (Senate Bill 1)*, provide for a carcinogenic protective risk range of 1x10-4 to 1x10-6, based on site-specific factors. More specifically, the 1x10-4 risk level can be considered for sites with institutional controls to prevent exposure to contaminated media. Section V of the SB states that there are no on-site human receptors for groundwater and the deed restriction will prevent future exposure of human receptors to groundwater. In these conditions, EPA and PADER guidance documents allow for the establishment of the 1x10-4 risk level.

The RFI risk assessment has shown that there is no risk onsite; however, if a hypothetical exposure scenario is considered, a risk level of 1x10-4 is appropriate, as noted above.

3. Page 11, fourth paragraph, last sentence.

"The Hazard Index at the facility is 62.5, which is greater than the acceptable level of 1.0"

As part of the RFI, GES developed a risk assessment for this site which calculated the highest Hazard Index for the site, relative to site-specific contaminants, to be 0.015. The RFI report, which includes the risk assessment, was unconditionally approved by the EPA in correspondence dated 25 March 1994 between Vernon Butler and Thomas Preble. This Hazard Index was apparently changed in the SB by the EPA. Quebecor objects to this unilateral EPA action which is not supported by the record and which directly contradicts the earlier assessment accepted by the EPA.

4. Page 15, first paragraph after "A. Media Clean-up Standards", second sentence.

"Media cleanup standards are established at concentrations that ensure protection of human health and the environment and are set for each media during the remedy selection process."

The RFI Risk Assessment accepted by EPA has demonstrated that there is no risk to human health or the environment. Furthermore, although Quebecor does agree with the necessity of source reduction in the railroad siding and UST areas, the cleanup standards set forth in this section are erroneously stringent and technologically impractical to meet.

5. Page 8, first paragraph after "IV. SUMMARY OF THE RCRA FACILITY INVESTIGATION", second sentence.

According to the findings of the RFI, the groundwater underneath the Facility contains concentrations of benzene, toluene, tetrachloroethylene, and bis(2-ethylhexyl)phthalate above EPA Region III risk-based concentrations and/or the Maximum Contaminant Levels ("MCLs") which were developed under the Safe Drinking Water Act, 42 U.S.C. Section 300(f) et seq. "

As noted in numerous locations throughout the RFI Workplan and in the RFI report, tetrachloroethylene (PCE) and bis(2-ethylhexyl)phthalate (DEHP) should not be considered chemicals of concern at this facility because of serious data quality concerns. Specifically:

Re PCE:

- PCE was used and stored only in laboratory quantities and used only from 31 August 1989 through 17 July 1991.
- PCE was first detected at this facility in a sample collected by PADER, and split with GES, from recovery well RW-1. GES did not analyze for PCE; however, PCE was detected in the PADER sample at a concentration of 1.6 parts per million. When GES requested information to complete data validation for the PADER sample, no chromatograph could be produced.
- During the completion of the RFI, PCE was only detected at the method detection limit in one well (MW-6) during one sampling event, only (Phase 5). However, the results from MW-6 (Phase 5) were suspect because the concentrations and method detection limits of other chemicals detected in MW-6 during the same sampling event were inconsistent with all other sampling data collected during the RFI. Specifically, the ratio of benzene to toluene detected in MW-6 were inversed, compared to concentrations in adjacent wells.

- At the request of the EPA, monitoring wells MW-9 and MW-10 were re-sampled on 17 August 1993 and split sampled by GES. Of specific concern to the EPA were the presence of PCE and its degradation products such as trichloroethylene (TCE) and 1,2-dichloroethylene (1,2-DCE). Neither PCE nor its daughter products were detected in either well.

Re DEHP:

- DEHP was not stored or used at their facility, and records show that DEHP was not stored or used at this facility by Quebecor's predecessors.

- DEHP is a common laboratory contaminant, and can easily be introduced to samples in the field or laboratory through sampling gloves or plastic sampling implements.

- DEHP was only detected twice during the RFI. The chemical was reported in MW-5 during Phase 5, at 0.011 parts per million (ppm) (note that this was reported as a 'J' value), and at 0.011 ppm in MW-12 during Phase 15.

6. Page 5; last paragraph on page

"Submit for EPA review and approval a post-UST removal/soil excavation soil sampling plan to demonstrate attainment of the soil clean-up standards presented in Section VIII, below."

The EPA has clearly noted in Section II of the SB its intent to defer the cleanup of soils in the vicinity of the UST area to the PADER. Considering this, Quebecor objects to the EPA requirement for EPA review and approval of a post clean-up sampling plan. It is Quebecor's position that all cleanup documents pertaining to soils in the UST area should only need to be approved by the regulating agency; namely, PADER. Otherwise, Quebecor is subject to potentially competing and conflicting demands by the two agencies.

Also, this paragraph indicates that soils in the UST area will need to be remediated to soil clean-up standards, as listed in Section VIII of the SB. The only soil clean-up standards in Section VIII are listed on Table 2 which, according to text, are based on "EPA Region III Risk-Based Concentration (RBCs) Tables". The standards listed in Table 2 are reproduced below:

CONSTITUENT	Soils (ppm) *RBCs*
Benzene	n/a
Toluene	0.5
Bis (2-ethylhexyl) phthalate	n/a
Ethylbenzene	1.0
Tetrachloroethylene	n/a
Xylene	0.7

(ppm = Parts per million)

These numbers match PADER Level 1 groundwater protection standards, and not soil RBCs from "EPA Region III Risk-Based Concentration (RBCs) Tables". If the EPA had actually intended to reference PADER groundwater protection standards, Quebecor notes that only PADER "Level 2" standards are applicable to this site. As noted in Cleanup Standards for Impacted Soil; PADER, December 1993, Level 2 standards apply to soils "that have been contaminated by spills, leaks, or discharges which occurred, in total, more than one year ago". All spills and releases considered in the SB occurred well over one year before the issuance of the SB.

Level 2 standards are presented in the following table:

CONSTITUENT	Soils (ppm) Level 2 Standards
Benzene	n/a
Toluene	2.0
Bis (2-ethylhexyl) phthalate	n/a
Ethylbenzene	5.0
Tetrachloroethylene	n/a
m-Xylene	5.0
p-Xylene	5.0
o-Xylene	3.0

If instead the EPA had intended to reference the soil RBCs from "EPA Region III Risk-Based Concentration (RBCs) Tables" (Roy L. Smith, Ph.D.; February 9, 1995) as suggested in the text of the SB, the choices would be as follows:

CONSTITUENT	Soils (ppm) Industrial Soil RBCs	Soils (ppm) Residential Soil RBCs	Soils (ppm) Transfer From Soil to Groundwater
Benzene	n/a	n/a	n/a
Toluene	410,000	16	5
DEHP	n/a	n/a	n/a
Ethylbenzene	200	7.8	5
Tetrachloroethylene	n/a	n/a	n/a
Xylene	100,000	160	74

(DEHP = Bis(2-ethylhexyl)phthalate)

Note that the main differentiation between "residential" and "industrial" soils (per EPA guidelines) centers around the assumption of childhood and adult exposure to impacted soils (residential) versus adult occupational exposure to impacted soils. It is the opinion of Quebecor that if these standards are used, industrial soil RBC's should be applied to this site. This opinion is based on the following:

- The Quebecor facility is a longstanding industrial site and will likely remain so in the future.
- The portions of the site which contain impacted soils are fenced in and/or continually monitored by a security guard, thus limiting access to adolescents or non-site personnel.
- No chemicals of concern have been detected in any of the sediment or surface soil (i.e., accessible soils) samples.

7. Page 9, second paragraph after "1. Groundwater", first sentence.

"Onsite groundwater sample analyses indicate that the concentrations of benzene, toluene, bis(2-ethylhexyl)phthalate, and tetrachloroethylene exceed the MCLs for those constituents"

As noted in comment #5, PCE and DEHP should be eliminated from chemicals of concern on this site.

8. Page 13, first paragraph after "VII. SUMMARY OF ALTERNATIVES", second sentence.

"PADER is currently directing the remediation of the UST area."

Section II of the SB suggests that the EPA will manage groundwater remediation in the tank field area and further notes that soil remediation issues in the tank field area will be deferred to the PADER. However, EPA has required approval of soil sampling plans and soil sampling results. These facts clearly suggest that EPA does not intend to delegate real authority to the PADER on soil remediation.

9. Page 5; first paragraph under "II. PROPOSED CORRECTIVE MEASURES", third sentence

"The facility is presently undertaking remediation for the UST area in accordance with PADER UST Closure Requirements, Act 32, Section 502(c), Storage Tank and Spill Prevention Act, July 6, 1989."

It is incorrect that the facility is "presently undertaking remediation for the underground storage tanks (UST) area in accordance with Pennsylvania Department of Environmental Resources (PADER) UST Requirements...". In actuality, Quebecor is currently undertaking remediation in the vicinity of the UST area in accordance with PADER requirements from 1985 and later with the interim measures section of the Administrative Consent Order (issued by EPA, 29 March 1991).

10. Page 6, first paragraph following "RAILROAD SIDING AREA"

"Conduct in-situ soil vapor extraction and volatilized gas treatment with granulated activated carbon (GAC) filtration and/or incineration in accordance with the Clean Air Act."

Quebecor requests that this statement be modified to read: Conduct in-situ soil vapor extraction and volatilized gas treatment with granulated activated carbon (GAC) filtration, incineration, *or other applicable treatment options* in accordance with the Clean Air Act."

11. Page 6, first paragraph following "INSTITUTIONAL CONTROLS", first sentence

"Impose a restriction in the deed to the Facility property to prevent the installation of on-site drinking water wells."

Extensive research has been completed as part of the RFI to determine the extent and magnitude of impact on the Quebecor facility property. The results of all investigative work has shown that impact is confined to the areas on the

developed portion of the Quebecor property. The developed portion is confined to the eastern half of a 42 acre parcel of Quebecor's 57-acre site. It is not in Quebecor's best interest to have deed restrictions on the additional 15 acres of facility property. Also, specifically note that as the two parcels are divided, there is approximately 1,000 feet between the western-most (downgradient) impacted monitoring well and the adjacent 15-acre parcel, thus providing a significant buffer zone between the impacted property and unimpacted parcel.

Therefore, Quebecor requests that deed restrictions only be considered for the developed portion of the property, including tax parcel number 36-7-3 (42 acres). Parcel number 36-7-2-2, which consists of the 15 acres of undeveloped property, should be exempt from deed restrictions.

Also, the SB should stipulate a procedure to lift deed restrictions after the ACL conditions described in the general comment section of this document have been attained.

12. Page 7, third paragraph after "C. Previous Investigations"

"In response to this spill, Maxwell implemented corrective measures which included liquid vacuum extraction from the impacted areas, pond aeration, pond monitoring and sampling. The Engel pond was subsequently restored with indigenous pond and stream biota. However, the RFI data indicated the presence of the solvent atop the groundwater at the facility. (see Section D., Interim Measures, below)."

All statements in this paragraph are accurate. However, as a clarification, the fact that Maxwell initiated corrective measures at the [Engel] pond and references to solvent on the groundwater are two separate issues. For clarity, both these references should not be included in the same paragraph.

13. Page 7, Last Paragraph on page

"In April 1990, EPA completed an Environmental Priorities Initiative Preliminary Assessment ("Assessment") for the Facility. According to the Assessment, benzene, toluene, ethylbenzene, xylene, tetrachloroethylene, bis(2-ethylhexyl)phthalate, cyanide, and lead have been released to the environment from the facility."

The information contained in this paragraph is not completely accurate. Please note the following:

- An Environmental Priorities Initiative Preliminary Assessment (Assessment) was completed by NUS Corporation (NUS) for EPA and is dated 23 October 1989. This report made no specific references to chemicals released to the environment from the facility.

- The 23 October 1989 Assessment did include sampling data relative to discharge monitoring reports (DMRs), soil sampling data relative to well installation, and well sampling data; however, none of this data was collected specifically for the Assessment. Also, information supporting the release of tetrachloroethylene, bis(2-ethylhexyl)phthalate, cyanide, or lead was not included anywhere in the Assessment.

- A Site Visit Summary Report was completed by NUS for EPA and is dated 8 May 1990. This report briefly summarizes analytical results for samples collected on 25 and 26 April 1990. This report makes no reference to the release of chemicals to the environment.

- Organic Data Validation and Inorganic Data Validation reports for the above-mentioned April 1990 sampling round, completed by Roy F. Weston for EPA and dated 29 August 1990 and 7 September 1990, respectively, identified the presence of benzene, toluene, ethylbenzene, xylenes, tetrachloroethylene, bis(2-ethylhexyl) phthalate, cyanide, and lead in samples. However, this report does not specifically state nor infer that any of these chemicals were released to the environment from the facility.

- Specific arguments were provided in the RFI report (see 7 February 1994 RFI, Section 4, Pages 10-12) noting that lead and cyanide detected at this facility are naturally occurring, and are not introduced by any processes undertaken at this facility.

- Further discussion on the presence of tetrachloroethylene on this site is further discussed in point #5.

- Further discussion on the presence of DEHP on this site is further discussed in point #5.

14. Page 8, first full paragraph

"In September 1993, Quebecor reported an additional 5,000 gallon spill of toluene in the UST area.

A 5,000-gallon spill did not occur in the UST area in September 1993. There was a 2,800-gallon spill in the area west of the bulk ink storage building area on 29 October 1993.

It is the understanding of Quebecor that all agency oversight and remediation efforts relative to the 29 October 1993 released are being managed by PADER. It is the opinion of Quebecor that all references to this release should be deleted from the final SB.

15. Page 8, first paragraph under "Interim Measures /Stabilization", first sentence.

"As a result of the 1985 Lactol discharge from the underground storage tanks, on October 25, 1986, Diversified (and later Quebecor) began implementing a groundwater recovery pump and treatment system to contain the solvent and prevent any further migration of the contaminated groundwater plume from the Facility."

The groundwater pumping system was fully operational by the end of August 1986.

16. Page 8, first paragraph under "Interim Measures /Stabilization", last sentence.

"In 1993, the air stripper tower was upgraded to include granular activated carbon filters to collect the air stripping exhaust gas emissions from the tower."

There is no granular activated carbon (GAC) treatment on air emissions at the existing air stripper, in accordance with PADER Air Emission Permit No. 15-330-002A.

A GAC unit is currently being used as a final polish to the air stripper effluent water, prior to its discharge.

17. Page 9, first paragraph after "1. Groundwater", first sentence.

"Groundwater was evaluated during the RFI through a onsite groundwater monitoring well network comprised of thirty-one onsite and four offsite monitoring wells."

There are only 28 onsite RCRA groundwater monitoring wells. Although four offsite residential drinking water sources were monitored by GES during the RFI, there are no offsite monitoring wells.

18. Page 9, first paragraph after "1. Groundwater", third sentence.

"Groundwater generally flows toward the south and discharges into Valley Creek."

Since the onset of investigations at this facility, groundwater has been shown to consistently flow toward the southwest.

19. Page 14, first paragraph after "5. BIOLOGIC ENHANCEMENT BY SOIL VENTING", fourth sentence.

"Capital cost is $172,500 and O&M cost is $867,900"

While this option was not suggested as a remedial alternative, for accuracy Quebecor wishes to clarify the following:

Per correspondence between GES and EPA, dated 27 September 1994, the total estimated capital cost for this remedial option is $304,200 and the total O&M costs are estimated to be between $590,000 to $912,100.

20. Page 15, "B. Points of Compliance".

General Comment

The SB does not list a monitoring frequency for the points of compliance. Quebecor will assume that the monitoring will follow the outline presented in the EPA-accepted Corrective Measures Study. That schedule is as follows:

Tankfield Area

- Sample designated tankfield monitoring wells annually to gauge improvements in groundwater quality.
- Monitor downgradient domestic well (Gallagher) annually for confirmation of risk assessment.

Railroad Siding Area

- Sample designated railroad siding monitoring wells annually to gauge improvements in groundwater quality.
- Monitor downgradient domestic well (Engel) annually for confirmation of risk assessment.

- Monitor air stripper influent and effluent waters for parameters dictated by the NPDES permit which would be necessary to operate a treatment system.

- Monitor air stripper and vapor system off-gas concentrations for parameters dictated by the air permit which would be needed to operate a system.

- Re-evaluate soil vapor extraction influent data after levels of VOCs stabilized or dropped below laboratory detection limits.

Further, Quebecor feels that as a generalization, the proposed points of compliance as stated in the SB are not acceptable. This issue is discussed in detail in the General Comments section.

21. Page 16, points "a." through "j.", listed under "1. On-Site Monitoring Wells:"

(lists ten wells to be included as "points of compliance")

Wells MW-3, MW-4, and RW-1 will likely be destroyed during the UST removal program. As a result, these wells cannot be used as points of compliance.

Additional detailed discussion on points of compliance is included in the "General Comments" section of this report.

22. Page 16, point "b.", listed under "2. Off-Site Monitoring Wells:"

(lists two locations to be included as "points of compliance")

The EPA has stated that no chemicals of concern have been detected in surface water or surface sediment samples. Considering this, Quebecor requests clarification on why the Engel Pond has been included as an "off-site monitoring well".

The Engel pond should be removed from this list for the following reasons:

- The Risk Assessment, accepted for this site by the EPA has demonstrated that the plume will not migrate to the pond.

- No chemicals of concern have been detected in surface water at or surrounding the Quebecor site since 1989.

- The Engel pond is a farm pond, and as such, is subject to the introduction of chemicals, and possibly volatile organic compounds not related to the Quebecor facility.

- The Engel pond is located next to a road, and is subject to the introduction of surface run-off from the roadway which may include chemicals, and possibly volatile organic compounds, not related to the Quebecor facility.

23. Page 16, first paragraph after "IX. EVALUATION OF PROPOSED REMEDY AND ALTERNATIVES", second sentence.

"The underground storage tank area is currently being remediated pursuant to the approved UST Workplan"

At the current time, the only remediation occurring in the tank field area is the removal and treatment of impacted groundwater, relative to interim measures, as defined by the Administrative Consent Order.

Further, the initial UST Workplan, submitted to PADER by GES was accepted with the understanding that remediation would be addressed as part of the Administrative Consent Order with the EPA. As stated in the SB, this is now not the case.

Therefore, it may be assumed that at this time, there is not officially an approved UST (removal) Workplan.

24. Page 18, first paragraph, second sentence.

"However, the low permeability of the soils at the Facility severely limits the efficiency of these alternative at this facility because the intermolecular spacing of the soil molecules restricts the passages of the VOC molecules."

For accuracy, this statement should read, "However, the low permeability of the soils at the Facility severely limits the efficiency of these alternative at this facility because the *interparticular* spacing of the soil *particles* restricts the passage of the VOC molecules."

25. Page 19, third paragraph after "1. Long Term Reliability and Effectiveness", third sentence.

"GW-2 (Pump and Treat) will provide long term reliability and effectiveness because GW-2 provides for the use of a proven groundwater technology which will remove groundwater contaminants and contain the plume, although it does not control the use of on-site groundwater for drinking water purposes."

Several published research studies have documented that pump and treat technology alone will not achieve contaminant removal in groundwater to drinking water standards (MCLs). Groundwater has no current or future use for drinking water; therefore, alternate contaminant levels should be

considered for the site-specific media clean-up standards. This is discussed in more detail in the general comments.

26. Page 21, last paragraph, third sentence.

"In addition, SW-3 [air sparging] and sw-5 [biological enhancement by soil venting] would simply transfer VOCs from the soil to the air without treatment."

It is inaccurate to state that biological enhancement by soil venting transfers VOCs from soil to the air. During biodegradation, VOCs are oxidized, resulting in the release of water vapor and carbon dioxide. Furthermore, most designs utilizing both both biological enhancement by soil venting and/or air sparging would incorporate subsurface vapor withdrawal and treatment.

27. Page 22, first paragraph, fourth sentence.

"The estimated total project cost and operation and maintenance cost of EPA's proposed Corrective Measures Alternative (GW-1, GW-2, and GW-2) is $861,100."

This estimated cost significantly underestimates the total project cost to be incurred by Quebecor by the corrective action detailed in the SB.

If remediation of the railroad siding area alone is initiated as proposed by the EPA, the estimated cost would be approximately one-half of $325,000 (the cost assumed for the entire site) for groundwater institutional controls plus $536,100 for groundwater pump-and-treat combined with in-situ soil vapor extraction, for a total of $698,600. Note that the EPA's estimate is only the cost for the railroad siding remediation.

The SB requests groundwater treatment but does not include costs for groundwater remediation in the tank field area. If groundwater pump-and-treat was also initiated in the tankfield area, an additional estimated cost of $1,498,700 would be accrued. This cost does not take into account soil remediation efforts which will be incurred during the UST removal. The combined project cost all aspects of remediation for the railroad siding area and the UST area is $2,777,800.

The attached Table 1 illustrates the total cost which would be incurred by Quebecor in order to comply with remediation to the media clean-up standards stated in the SB.

TABLE 1
QUEBECOR PRINTING ATGLEN INC.
STATEMENT OF BASIS

COST COMPARISON TABLE FOR REMEDIAL OPTIONS

Remedial Options	Costs for Options Presented in CMS (Railroad Siding)	Costs for Options Presented in CMS (Tank Field Area)	Costs for Remediation Total	Costs for Remediation as Prsented in S.B.*
Soil Vapor Extraction (SVE)	------	------	------	------
Pump and Treat (P&T)	------	$1,498,700	$1,498,700	------
SVE and P&T	$536,100	------	$536,100	$536,100
Institutional Controls	$162,500	$162,500	$325,000	$325,000
Soil Removal	------	$324,000	$324,000	------
Tank Removal	------	$94,000**	$94,000	------
Total	$698,600	$2,079,200	$2,777,800	$861,100

* S.B. - Statement of Basis

** Total cost exclusive of soil disposal.

APPENDIX A

SUMMARY OF GROUNDWATER DISSOLVED PHASE TRANSPORT MODEL

SUMMARY OF THE GROUNDWATER MODEL FOR QUEBECOR PRINTING ATGLEN INC. SITE

1.0 OBJECTIVE

GES modeled the movement of dissolved toluene, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate in the shallow groundwater zone onsite utilizing the U.S. Geological Survey's (Konikow and Bredehoeft, 1978) solute transport model, Method of Characteristics (MOC). The modeling was simulated under assumed, two-dimensional, homogeneous, steady-state flow conditions with advection, dispersion, sorption, and first-order decay of the targeted compounds. The objective of this simulation is to conservatively estimate the movement of toluene, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate over a 23-year period following assumed releases in the tankfield area and in the vicinity of RW-2 and to evaluate potential impacts to off-site potable wells.

2.0 DISSOLVED-PHASE TRANSPORT MODELING

Two areas of concern were simulated during the computer modeling: the tankfield area (area 1) and the area in the vicinity of RW-2 (area 2). Since separate-phase products were detected in several onsite monitoring wells, MW-4, RW-1, RW-2, and S-3, continuous toluene sources were assumed conservatively to be located at the tankfield and in the vicinity of RW-2 for 23 years. Since 230 part per million (ppm) of toluene was detected in MW-10 during the March 1 to 10, 1993 sampling event, the modeled cells located between MW-10 and RW-2 were all assumed conservatively to represent continuous source areas. Please note that the source areas used in the modeling are likely larger than the actual source areas onsite. Refer to RFI Report dated February 7, 1994 for more information.

Toluene and ethylbenzene concentrations in the source areas were set at solubilities in water of 515 and 152 ppm (Montgomery and Welkom, 1990), respectively. Benzene and bis(2-ethylhexyl)phthalate source were set conservatively at concentrations of 100 ppm and 0.1 ppm, respectively. Please note that the highest concentrations detected in March 1 through 10, 1993 groundwater samples were 0.25 ppm (MW-3 and RW-2) for benzene and 0.011 ppm (MW-12) for bis(2-ethylhexyl)phthalate, and the solubility of bis(2-ethylhexyl)phthalate in water is 0.4 ppm (Montgomery and Welkom, 1990). Please note that bis(2-ethylhexyl)phthalate is a common laboratory contaminant and the presence of this compound may be due to laboratory contamination. The transport potential of xylenes was not modeled since the modeling of benzene and toluene represents a conservative solute transport estimates.

The parameters used in the computer simulations represent conservative estimates based on field observation. The effective porosity was set at 0.20. In order to conservatively estimate solute transport, the highest calculated hydraulic conductivity measured at the site (3.99 x 10-5 cm/sec) was used in the modeling. The smallest organic fraction detected at an depth of 5 to 30 feet below grade in each area of concerned was used (0.001 in area 1 and 0.027 in area 2). The half-life of decay for toluene and ethylbenzene is reportedly at 28 and 228 days, respectively, in aerobic groundwater (Howard, P.H. et al, 1991). A

half-life of decay for both toluene and ethylbenzene was assumed conservatively to be 365 days during the modeling. In addition, the movements of toluene, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate were also modeled with no decay. All the values used in this modeling are either based on field data or published estimates.

Due to low or nondetect concentrations in groundwater samples collected from the onsite monitoring wells, and the use of conservative sources areas (3,750 square feet for area 1 and 17,500 square feet for area 2), conservative sources areas (515 ppm for toluene, 152 ppm for ethylbenzene, 100 ppm for benzene, and 0.1 ppm for bis (2-ethylhexyl)phthalate), the smallest organic fraction detected in each area of modeling (0.001 for area 1 and 0.027 for area 2), conservative half-life decay of the targeted compounds (365 days for both toluene and ethylbenzene), and the largest calculated hydraulic conductivity of the shallow aquifer (3.99 x10-5 cm/sec) in the modeling, verification and calibration of the model was not performed. The calculated concentrations of toluene, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate represented assumed conditions, which were more conservative than the actual values. The predicted extent and concentration of the impacted groundwater at this site represents the most conservative estimate for the impacted groundwater at the site, and are larger than the observed extent and dissolved concentrations detected at the site. Refer to RFI Report dated 7 February 1994 and GES' correspondence dated 10 March 1994 to Mr. Daniel Snowden of PADER for more information.

The comparison of the computer simulations to the actual analytical data suggests that degradation and sorption processes retard the movement of toluene and ethylbenzene so that the rate of degradation and sorption are equivalent to the rate of groundwater migration. Due to the degradation and sorption process, the extent of toluene and ethylbenzene plumes may be close to their steady state conditions. Under the conservative assumptions discussed-above, the predicted toluene, ethylbenzene, and bis(2-ethylhexyl)phthalate plumes still remain onsite over 23 years after the release and these compounds will have no impact to offsite potable wells under the assumed modeling conditions. In addition, this modeling did not consider the effect of the existing groundwater remedial system onsite. The hydraulic control conducted at two recovery wells (RW-1 and RW-2) will further limit the migration of the impacted groundwater from the source areas. The extent of the predicted, impacted groundwater plume will be smaller if groundwater pumping at RW-1 and RW-2 is considered.

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APPENDIX B

ASSESSMENT OF NATURAL BIOREMEDIATION POTENTIAL AT THE QUEBECOR PRINTING ATGLEN INC. SITE

ASSESSMENT OF NATURAL BIOREMEDIATION POTENTIAL AT THE QUEBECOR PRINTING ATGLEN SITE, ATGLEN, PA

NATURAL BIOREMEDIATION

Natural bioremediation is a term that is being used to describe the process of allowing naturally occurring microorganisms to degrade contaminants that have been released into the subsurface and at the same time minimizing the risks to public health and the environment (Borden, 1993). Natural bioremediation is not a "No Action" alternative because it requires documentation of the role of the native microorganisms in eliminating the contaminants via tests performed at field sites or on site-derived samples of soil and groundwater (NRC, 1993).

The elimination of the contaminants can be accomplished by biodegradation. Biodegradation of hydrocarbons by the indigenous (native) subsurface microorganisms is an oxidation-reduction reaction where the hydrocarbon is oxidized (donates electrons) and an electron acceptor (e.g. oxygen) is reduced (accepts electrons). Several compounds are available in either the subsurface soils or groundwater that can serve as electron acceptors for the appropriate oxidation-reduction reactions: oxygen (O_2), nitrate (NO_3-), iron oxide (e.g. $Fe(OH)_3$), sulfate (SO_4=), and carbon dioxide (CO_2). The process of metabolizing organic compounds when utilizing oxygen as an electron acceptor is termed aerobic respiration. The major byproducts of aerobic respiration are carbon dioxide, water and microbial biomass. When the microorganisms use an inorganic chemical other than oxygen as an electron acceptor the process is termed anaerobic respiration. Iron, nitrate and sulfate are examples of these alternative electron acceptors. The byproducts of anaerobic respiration can include nitrogen gas (N_2), hydrogen sulfide (H_2S), reduced forms of metals, and methane (CH_4), depending on the electron acceptor. Monitoring changes in the concentrations of the electron acceptors is one method of documenting the role that the native microorganisms have in eliminating the designated contaminants.

There have been several studies which have presented well-documented evidence that plumes of dissolved hydrocarbons are amenable to biodegradation in the subsurface. Examples of results from these studies are summarized in Table 1. These studies have provided evidence that under certain conditions, natural bioremediation can effectively confine and treat the contaminants of concern. The following is a discussion of the natural bioremediation potential of the Quebecor site.

QUEBECOR NATURAL BIOREMEDIATION ASSESSMENT

The first step in considering a site for the application of natural bioremediation is to complete a conventional site characterization. Included in this search should be:

1.) Detailed description of the subsurface hydrogeology and geology.

2.) Delineation of the contaminant source area and any mobile non-aqueous phase liquids (NAPLs).
3.) Delineation of the extent of the contaminant plume.
4.) Identification of any downgradient receptors (wells or surface discharges) that could be potentially affected.

Based on previous activities conducted at the site, much of this information is currently available and has been discussed in previous reports (RFI Report, February 7, 1994). Additional information that is necessary to evaluate the implementation of a natural bioremediation program includes the following (Borden, 1993):

1). Is the contaminant biodegradable?

At the Quebecor site, the main contaminant of concern is toluene. There is laboratory and field evidence available from other studies indicating that toluene is biodegradable by indigenous microorganisms present in subsurface environments under both aerobic and anaerobic conditions (Alvarez and Vogel, 1991; Beller et.al, 1991, Borden et. al, 1994; Chiang et al.; Grbic-Galic and Vogel, 1987; Hutchins et al, 1991; Kuhn et al, 1985, 1988; Lovley and Lonergan, 1990; Lovley et al., 1989; Milhelic and Luthy, 1991; Salanitro, 1993; Zeyer et al, 1986). Data from a study that was performed at the Quebecor site, as will be discussed below, also support biodegradation of toluene.

2). Are environmental conditions appropriate for biodegradation?

In May of 1994, GES personnel performed a Bioremediation Assessment at the site. Field and laboratory testing was performed to evaluate if the use of bioremediation techniques for remediation of hydrocarbon contamination at the site were warranted. An evaluation of current site conditions relative to microbiological activity was made in order to establish baseline levels and to determine if onsite conditions are optimal for bioremediation. Bioremediation characterization of the groundwater and soil consisted of microbial enumerations, inorganic and organic analyses. The results from this study have been previously discussed (Corrective Measures Study (CMS) August, 1994). The data indicated the presence of all categories of microorganisms sampled at the site over a wide range of toluene concentrations. This suggested an enrichment of the indigenous microbial community for populations with the metabolic capabilities to degrade toluene. The inorganic analyses that were performed also suggested that site conditions are acceptable for bioremediation.

3). Is biodegradation occurring in the aquifer?

In areas of active microbial degradation of hydrocarbons, depressed levels of oxygen and elevated levels of carbon dioxide relative to background levels would be expected. In areas of hydrocarbon impact, as the available oxygen is consumed, as shift away from aerobic towards anaerobic conditions will occur. In order to evaluate the Quebecor site conditions in regards to these characteristics, GES personnel performed a soil gas survey in the vadose zone soils at the site in May of 1994. The results of this study were reported in the CMS of August 1994.

GES personnel also performed an *in situ* respiration test at the site in May of 1994. This entailed monitoring the soil gas levels of oxygen and carbon dioxide in soil gas monitoring probes in an array of monitoring points. These readings were collected for approximately 70 hours after the performance of a soil gas permeability test (during the soil gas permeability test the subsurface soils were aerated via vapor extraction). The results from this test were used to evaluate if *in situ* microbial activity was occurring, the rate at which it was occurring, and whether it was oxygen limited. The results of this study were also reported in the CMS of August 1994.

The data obtained from both studies, as well as from the initial bioremediation evaluation (microbial enumerations, inorganic nutrient levels) suggested that aerobic biodegradation is occurring in toluene impacted areas of the site. From the results of the *in situ* respiration test, an aerobic biodegradation rate of 4.04 mg of toluene per kg of soil per day was estimated. Additional sampling and monitoring would be required to determine the extent of the anaerobic microbial degradation activities.

4). If the waste doesn't completely biodegrade, where will it go?

In order to adequately manage a natural bioremediation system, the consequences of a system failure need to be considered. For most sites, the major consequence of a system failure would be the contamination of water supply wells or contamination of surface water.

At the Quebecor site, groundwater modeling was performed to simulate the potential fate of toluene. The results from the simulation were presented in the February 7, 1994 RFI report. The study indicated that with the use of very conservative assumptions, the predicted toluene plume should remain onsite over 23 years after a release, and should have no impact to offsite potable supply wells. Comparison of the computer simulation to the analytical data collected at the site also supports the contention that biodegradation and sorption processes should contribute to the immobilization, reduction and elimination of toluene mass in the aquifer system.

CONCLUSION

The above discussion suggests that natural bioremediation can be considered a potential technique for the mitigation of the toluene contamination at the site. The monitoring of dissolved oxygen, redox potential, alternative electron acceptors and carbon dioxide levels as part of the regularly scheduled groundwater monitoring program are recommended. This data would be used to continue to document that site conditions continue to be conducive for natural bioremediation.

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Table 1. Summary of Natural Bioremediation Investigations (Borden, 1993, Buscheck et.al, 1993)

CONTAMINANT	LOCATION	RESEARCHERS	SUMMARY OF FINDINGS
Creosote	Conroe, Texas	R.S. Kerr Envir. Res. Lab. (US EPA) National Center For GW Research	Demonstrated that an adapted population of creosote-degrading microorganisms was present in the contaminated zone and not in uncontaminated regions of the aquifer. Creosote biodegradation was correlated with the availability of DO. Results were used to develop and calibrate the computer model BIOPLUME to simulate hydrocarbon transport and aerobic biodegradation within the aquifer. Model results indicated that removal of the contaminant source would be adequate to contain the hydrocarbon plume and active remediation by pump and treat would not be required.
Creosote	St. Louis Park, Minnesota	U.S. Geological Survey	Field studies at the contaminated aquifers indicated that methane production was occurring in zones within the aquifer that had been contaminated with creosote. Later studies demonstrated the presence of anaerobes (denitrifers, iron reducers, sulfate reducers and methanogens) were correlated with the presence of creosote.
Creosote	Pensacola, Florida	U.S. Geological Survey	Work at an abandoned creosote site has shown a wide variety of organic compounds present in the aquifer were undergoing methanogenic biodegradation and that transport distances in the aquifer were undergoing methanogenic biodegradation and that transport distances in the aquifer could be correlated with biodegradation rates observed in the laboratory.
Crude Oil	Bemidji, Minnesota	U.S. Geological Survey	The production of large volumes of methane in the unsaturated zone immediately below a crude oil spill were observed. Also observed was a two order of magnitude decrease in alkylbenzene concentration over a downgradeint travel distance of 150m. The decrease was accompanied by elevated concentrations of aliphatic and aromatic acids in the groundwater. These acids were identified as intermediates in the anaerobic degradation of alkylbenzenes.
BTEX	11 sites from CA, CO, NV, VA & UT	Chevron Research and Technology Company	Reviewed groundwater analytical data from 11 sites; data was evaluated to quantify the change in contaminant concentration as a function of time and distance in order to describe contaminant attenuation. Measured decrease in contaminant concentration over time or distance can be due to sorption, dispersion, and degradation. Degradation is the only attenuation mechanism that leads to an actual decrease in contaminant mass. Evaluation included plots of concentration versus time and concentration versus distance demonstrated apparent first order decay rates at these sites. Measurements of dissolved oxygen, oxidation potential and alternative electron acceptors suggested the role of intrinsic bioremediation in the disappearance of contaminants at four of the sites.